Ontario

Ontario Ministry of Agriculture, Food and Rural Affairs

2006 SUPPLEMENT

Field Crop Protection Guide

Publication 812S

Keep this supplement with your 2005 edition of the *Field Crop Protection Guide*, Publication 812. All page references in this supplement correspond to the 2005 edition. For complete information please refer to the full edition.

This supplement includes information on:

NEW PRODUCTS	DISCONTINUED PRODUCTS	NEW REGISTRATIONS
Gemini	Dividend XL	Cruiser 5FS – Corn and Soybeans
Bumper 418EC	Guthion for use in field crops	Cruiser 350FS – Edible Beans
Quilt	Sniper for use in field crops	Headline – for Frog Eye Leaf Spot
		Headline – for Asian Soybean Rust
		Quadris – for Asian Soybean Rust
		Tilt 250E – for Asian Soybean Rust
		Folicur 432F – Soybeans and Wheat

NEW PESTS ADDED		
INSECTS	DISEASES	
Tarnished Plant Bug – Canola	Frog Eye Leaf Spot – Soybeans	Seed-Borne Septoria – Rye
	Pythium Damping Off – Oats and Rye	Common Bunt – Rye
	Seedling Blight – Oats	Dwarf Bunt – Rye

LABEL CHANGES
Matador 120 EC in canola – PHI is now 7 days

2007-01578/

Additions for 2006 in Bold:

TABLE 1–7. Seed Treatments (page 12)

TRADE NAME	Active Ingredient	Chemical Family	Risk of Resistance Developing*	Formulation	Crops	Manufacturer	Ontario Schedule[1]
Fungicides							
Gemini	**triticonazole + thiram**	**triazole + dithiocarbamate**	**low to medium**	**F**	**wheat, barley, oats**	**BASF Canada**	2
Insecticides							
Cruiser 5FS	thiamethoxam	chloronicotine	medium to high	F	**corn, soybeans**	Syngenta Crop Protection	2
Cruiser 350FS	thiamethoxam	chloronicotine	medium to high	F	wheat, barley, **beans**	Syngenta Crop Protection	2

DB = Drill Box Application; EC = Emulsifiable Concentrate; F = Flowable; LS = Liquid Suspension; P = Powder

[1] The numbers identify the Schedules in which the TRADE NAME products listed in this table are classified under the *Pesticide Act*. See Appendix C, Ontario Classification Schedules, on page 80 for an explanation of schedules.

* risk of resistance based on continuous use of product

TABLE 1–8. Fungicides (page 13)

TRADE NAME	Active ingredient	Fungicide Classification	Days to Harvest	Relative Toxicities	Aerial Application	Manufacturer	Use and Remarks	Ontario Schedule[1]
Bumper 418 EC	**propiconazole**	**triazole**	**corn: 14 cereals: 45 canola: 60 beans: 28**	**low**	**yes for all crops listed**	**UAP Canada Inc.**	**wheat, oats, barley, corn, canola, dry edible beans, soybeans (for seed only)**	**2**
Folicur 432F	**tebuconazole**	**triazole**	**wheat: 36 soybeans: 21**	**low**	**yes for all crops listed**	**Bayer CropScience**	**wheat, soybeans (emergency use only – expires Nov. 30,2006**	**2**
Headline EC	pyraclostrobin	strobilurin	corn: 7 **soybeans: 21** beans: **7** cereals: do not apply after the boot stage (zadok's 47 and beyond.)	low	yes for all crops listed except corn	BASF Canada	corn, **soybeans,** wheat, barley, rye, dry edible beans	2

TABLE 1–8. Fungicides (page 13)

TRADE NAME	Active ingredient	Fungicide Classification	Days to Harvest	Relative Toxicities	Aerial Application	Manufacturer	Use and Remarks	Ontario Schedule[1]
Quadris	azoxystrobin	strobilurin	canola: 30 **soybeans: 15** seed corn: 7 beans: 15	low	yes for all crops except seed corn	Syngenta Crop Protection	canola, seed corn, dry edible beans, **soybeans**	2
Quilt	**azoxystrobin + propiconazole**	**strobilurin + triazole**	**soybeans: 30** **beans: 30**	**low**	**yes for all crops listed**	**Syngenta Crop Protection**	**beans, soybeans**	2
Tilt 250E	propiconazole	triazole	corn: 14 **soybeans: 30** cereals: 45 canola: 60 beans: 28	low	yes for all crops listed	Syngenta Crop Protection	wheat, oats, barley, corn, canola, dry edible beans, soybeans (for seed only)	2

E = Emulsifiable Concentrate; EG = Extruded Granular; F = Flowable; WP = Wettable Powder
[1]The numbers identify the Schedules in which the TRADE NAME products listed in this table are classified under the *Pesticide Act*. See Appendix C, Ontario Classification Schedules, on page 80 for an explanation of schedules

TABLE 1–9. Insecticides (page 15)

TRADE NAME	Active ingredient	Insecticide Classification	Days to Harvest	Relative Toxicities	Aerial application	Manufacturer	Use and Remarks	Ontario Sch.[1]
Matador 120EC	cyhalothrin-lambda	pyrethroid	corn: 14 canola: **7** wheat: 28 beans: 14 soybeans: 21	moderate	**yes for all crops listed except soybeans and beans**	Syngenta Crop Protection	corn, canola, alfalfa, wheat, barley, oats, soybeans, beans	**5**

E = Emulsifiable Concentrate; EG = Extruded Granular; F = Flowable; WP = Wettable Powder
[1] The numbers identify the Schedules in which the TRADE NAME products listed in this table are classified under the *Pesticide Act*. See Appendix C, Ontario Classification Schedules, on page 80 for an explanation of schedules

2. Corn (Field and Seed)

Additions/Corrections are highlighted in Bold.

Additions to TABLE 2–1. Corn (Field and Seed) Seed and Soil Applied Insecticide Recommendations (page 17)

INSECTS

Active Ingredients	Trade Name	Formulation	Corn Insects			
			Corn Rootworm	Wireworm	Seedcorn Maggot	Black Cutworm
Seed Treatments						
Untreated Seed						
thiamethoxam	**Cruiser 5FS**	**F**	—	+	+	—

DB = Drill Box Application; F = Flowable; G = Granular; P = Powder
+ = recommended for insect listed — = NOT recommended S = suppression

TABLE 2–2. Chemical Control Options for Insects in Field and Seed Corn

INSECTS

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
WIREWORMS				
Seed Treatment			**per 80,000 kernels**	
Risk factors include: history of cereal/corn/grassy weeds, sandy soils, history of wireworm problems, coming out of sod. Threshold is one wireworm per bait trap. For bait trap information, see OMAFRA Publication 811, Agronomy Guide for Field Crops.	clothianidin	Poncho 250	33.3 mL	**For use in commercial seed treaters only.** Seed-applied insecticides can affect seed drop and final plant stands. Use talc or graphite according to planter recommendations to ensure accuracy.
	imidacloprid	Gaucho 480 FL	27 mL	**For use in commercial seed treaters only.** Seed-applied insecticides can affect seed drop and final plant stands. Use talc or graphite according to planter recommendations to ensure accuracy.
	thiamethoxam	**Cruiser 5FS**	**16.7 mL**	**For use in commercial seed treaters only. Do not graze or feed livestock on treated areas for 45 days after planting.**

TABLE 2–2. Chemical Control Options for Insects in Field and Seed Corn

INSECTS

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
SEEDCORN MAGGOT				
Seed Treatment			**per 100 kg seed**	
	For all seed treatments use full rate and ensure good coverage of seed.			
Seedcorn maggot problems in corn are extremely rare in Ontario. Expect only 60-70% control with on-farm applied seed treatments.	diazinon + captan	Agrox B-2	340 g	Available as 2 kg container and will treat 600 kg of corn seed. Do not use on seed already treated with an insecticide. Seed within 1 month of treatment.
		Agrox CD	200 g	Available as a 600 g container and will treat 300 kg of corn seed. Use this product only on seed previously treated with captan or thiram.
			per 80,000 kernels	
	clothianidin	Poncho 250	33.3 mL	**For use in commercial seed treaters only.** Seed-applied insecticides can affect seed drop and final plant stands. Use talc or graphite according to planter recommendations to ensure accuracy.
	thiamethoxam	**Cruiser 5FS**	**16.7–33.3 mL**	**For use in commercial seed treaters only. Use the higher rate for fields that have a history of moderate to severe pest pressure. Do not graze or feed livestock on treated areas for 45 days after planting.**
EUROPEAN CHAFER (WHITE GRUB)				
Seed Treatment			**per 80,000 kernels**	
Risk factors: sandy soils, especially on knolls with low organic matter, an open dry autumn increases the risk.	clothianidin	Poncho 250	33.3 mL	**For use in commercial seed treaters only.** Seed-applied insecticides can affect seed drop and final plant stands. Use talc or graphite according to planter recommendations to ensure accuracy.
	thiamethoxam	**Cruiser 5FS**	**16.7 mL**	**For use in commercial seed treaters only. Do not graze or feed livestock on treated areas for 45 days after planting.**

TABLE 2–2. Chemical Control Options for Insects in Field and Seed Corn

INSECTS

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
FLEA BEETLES				
Seed Treatment			**per 80,000 kernels**	
Flea beetles are a vector of Stewart's bacterial wilt disease. It is uneconomical to spray corn with insecticides to protect against Stewart's wilt except in seed corn with highly susceptible inbreds.	clothianidin	Poncho 250	33.3 mL	**For use in commercial seed treaters only.** Seed-applied insecticides can affect seed drop and final plant stands. Use talc or graphite according to planter recommendations to ensure accuracy.
	imidacloprid	Gaucho 480 FL	100 mL	**For seed corn only**. Ensure good coverage. **For use in commercial seed treaters only.** Seed-applied insecticides can affect seed drop and final plant stands. Use talc or graphite according to planter recommendations to ensure accuracy.
	thiamethoxam	**Cruiser 5FS**	**16.7–33.3 mL**	**For use in commercial seed treaters only. Do not graze or feed livestock on treated areas for 45 days after planting.**

TABLE 2–4. Chemical Control Options for Diseases in Field and Seed Corn

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
RUST			**per ha (per ac)**	
Rust is generally not a problem in Ontario except when infection begins early in the season or before flowering. Field corn has good resistance when compared with seed corn, sweet corn and specialty corn hybrids. As a result, foliar fungicides in field corn are not needed unless significant disease appears before corn tassels. Humid, cool conditions favour the disease.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground and aerial application. Apply when rust pustules 1st appear. Can be tank mixed with Ripcord or Matador insecticide for insect and disease control. Under severe disease pressure a second application 14 days later may be necessary. ***Only in seed corn, under severe disease pressure, a 3rd application 14 days later can be made.*** 14 days to harvest.

TABLE 2–4. Chemical Control Options for Diseases in Field and Seed Corn

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
RUST (CONT'D)			**per ha (per ac)**	
	propiconazole	**Bumper 418 EC**	**300 mL (121 mL)**	**Ground and aerial application. Apply when rust pustules 1st appear. Can be tank mixed with Ripcord or Matador insecticide for insect and disease control. Under severe disease pressure a 2nd application 14 days later may be necessary. *Only in seed corn, under severe disease pressure, a 3rd application 14 days later can be made.* 14 days to harvest.**
	azoxystrobin	Quadris	453 mL (183 mL)	**Seed corn only**. Ground application only. Apply prior to disease development. 2nd application may be made 7–14 days later. Maximum 2 applications per season. 7 days to harvest.
	pyraclostrobin	Headline EC	400–600 mL (160–240 mL)	Ground application only. Use a minimum water volume of 100L/ha. For optimal disease control, begin applications prior to disease development. Do not graze treated crop within 6 days of last application. 7 days to harvest. Maximum of 2 applications/yr. 48 hr re-entry period.
EYE SPOT			**per ha (per ac)**	
Many resistant or tolerant commercial hybrids are available. Crop rotation and tillage will reduce inoculum levels in surface residues. In reduced tillage systems, rotation and resistance are necessary. Chemical control usually not economical in field corn but may be necessary if a very susceptible seed corn inbred used.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground and aerial application. Apply when disease first appears. Can be tank mixed with Ripcord or Matador insecticide for insect and disease control. 14 days to harvest.
		Bumper 418 EC	**300 mL (121 mL)**	**Ground and aerial application. Apply when disease first appears. Can be tank mixed with Ripcord or Matador insecticide for insect control. 14 days to harvest.**
GREY LEAF SPOT			**per ha (per ac)**	
The disease is becoming more common in southwestern Ontario. Some hybrids are tolerant/resistant to the disease. Crop rotation and tillage will reduce inoculum levels in surface residues. In reduced tillage systems, rotation and resistance are necessary. Chemical control usually not economical in field corn.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground and aerial application. Apply when disease first appears. Can be tank mixed with Ripcord or Matador insecticide for insect and disease control. 14 days to harvest.

TABLE 2–4. Chemical Control Options for Diseases in Field and Seed Corn

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
	propiconazole	**Bumper 418 EC**	**300 mL (121 mL)**	**Ground and aerial application. Apply when disease first appears. Can be tank mixed with Ripcord or Matador insecticide for insect control. 14 days to harvest.**
	pyraclostrobin	Headline EC	400–600 mL (160–240 mL)	Ground application only. Use a minimum water volume of 100L/ha. For optimal disease control, begin applications prior to disease development. Do not graze treated crop within 6 days of last application. 7 days to harvest. Maximum of 2 applications/yr. 48 hr re-entry period.

3. Soybeans

TABLE 3–1. Chemical Control Options for Insects in Soybeans

INSECTS

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
SEEDCORN MAGGOT				
Seed Treatment			**per 100 kg seed**	
	For all seed treatments use full rate and ensure good coverage of seed.			
Consider insecticide seed treatments in early planted fields where large amounts of manure, green manure or residue have been recently incorporated or when cool backward emergence conditions are expected. Expect only 60-70% control with on farm applied seed treatments.	diazinon + captan	Agrox B-2	340 g	Available as 2 kg container and will treat 625 kg of soybean seed. Do not use on seed already treated with an insecticide. Seed within 1 month of treatment.
		Agrox CD	200 g	Available as a 600 g container and will treat 300 kg of soybean seed. Use this product only on seed previously treated with captan or thiram.
	thiamethoxam	**Cruiser 5FS**	**50-83 mL**	**For use in commercial seed treaters only. Use higher rate when insect populations are expected to be high. Do not graze or feed livestock on treated areas for 45 days after planting.**

TABLE 3–3. Chemical Control Options for Diseases in Soybeans

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
ASIAN SOYBEAN RUST				
Foliar Treatment			per ha (per ac)	
Asian soybean rust is a new invasive fungal disease of soybean in North America. Scouting and early detection are critical to managing this disease. The early stages of the disease can be confused with other common foliar diseases such as septoria brown spot, bacterial pustule, downy mildew, frogeye leaf spot and bacterial blight. Numerous factors such as crop stage (R1 to R6), yield potential, disease risk or presence are critical components of the fungicide decision process. Strobilurin fungicides such as Headline or Quadris are protective products which stop spore germination and penetration into the soybean leaf. The strobilurins have no effect on the fungus once inside the leaf. Since the stobilurin group of fungicides have NO curative activity, do not make solo applications of a strobilurin if any rust is present. The triazole fungicides such as Tilt and Folicur have varying protective abilities and are usually considered "early post-infection" fungicides. The post infection or curative abilities are limited and they may not perform well if 5-10% disease is present in the lower crop canopy. Combination products containing both a strobulurin and triazole fungicide such as Quilt have preventative (pre-infection) and curative (post-infection) properties.	**pyraclostrobin**	**Headline EC**	**400–600 mL (160–240 mL)**	**Ground and aerial application. Maximum of 2 applications per year. Classified as a strobilurin fungicide and therefore needs to be used in a preventative fungicide program (pre-infection). See label for resistance management strategy. 21 days to harvest interval. 48 hr re-entry period.**
	azoxystrobin	**Quadris**	**455 mL (182 mL)**	**Ground and aerial application. Maximum of 2 applications per year. Classified as a strobilurin fungicide and therefore needs to be used in a preventative fungicide program (pre-infection).See label for resistance management strategy. 15 days to harvest interval.**
	propiconazole	**Tilt 250E**	**500 mL (200 mL)**	**Ground and aerial application. Make first application at the first sign of disease followed by a second application 14 days after the first application if environmental conditions are favourable for disease development. Maximum of 2 applications per year. See label for resistance management strategy. 30 days to harvest interval.**
	azoxystrobin + propiconazole	**Quilt**	**1.0–1.5 L (400–600 mL)**	**Ground and aerial application. Make the first application at the first sign of disease. Apply the high rate only under conditions of high disease pressures. A second application at 14 days interval may be needed if conditions persist. Good spray coverage and canopy penetration are important for best results. Apply in a minimum of 45 L of water per hectare. Maximum of 2 applications per year. See label for resistance management strategy. 30 days to harvest interval.**

TABLE 3–3. Chemical Control Options for Diseases in Soybeans

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
ASIAN SOYBEAN RUST				
Foliar Treatment (cont'd)			per ha (per ac)	
Yield loss is very likely once rust can be found in the mid crop canopy. For these reasons, scouting, fungicide selection, timing and application are critical to successful management of soybean rust. **For further information on scouting techniques, sentinel plots, thresholds, management options and emergency use registrations, see the OMAFRA website, as well as the Ontario Soybean Growers website at: www.soybean.on.ca.**	**tebuconazole**	**Folicur 432F**	**292 mL (118 mL)**	***For Emergency Use Only. Registration of this product expires November 30, 2006.*** **Make first application at the first sign of disease followed by a second application 10- 14 days after the first application if environmental conditions are favourable for disease development. Apply a maximum of 2 applications per year. See label for resistance management strategy. 21 days to harvest interval.**
FROG EYE LEAF SPOT				
			per ha (per ac	
Economic impact is minimal and frog-eye leaf spot occurs under hot, humid conditions particularly on very susceptible varieties. The disease is most frequent in the extreme southwest counties.	**pyraclostrobin**	**Headline EC**	**400–600 mL (160–240 mL)**	**Ground and aerial application. Maximum of 2 applications per year. Make first application at the first sign of disease followed by a second application 14 days after the first application if environmental conditions are favourable for disease development. 21 days to harvest interval. 48 hr re-entry period.**
	propiconazole	**Bumper 418 EC**	**300–455 mL (121–184 mL)**	***For soybeans grown for seed only.*** **Ground application only. Apply when disease first appears. Under severe disease pressure, make a second application 14 days after. 50 days to harvest interval.Soybean seed should not be used for human or animal consumption.**
		Tilt 250 E	**500–760 mL (200–308 mL)**	***For soybeans grown for seed only.*** **Ground application only. Apply when disease first appears. Under severe disease pressure, make a second application 14 days after. 50 days to harvest interval. Soybean seed should not be used for human or animal consumption.**

TABLE 5–3. Chemical Control Options for Diseases in Wheat

WHEAT DISEASES				
Integrated Pest Management Options	**Active Ingredient**	**Trade Name**	**Rate**	**Comments (Days to harvest, label precautions, etc.)**
FUSARIUM (SEED-BORNE, SEED ROT AND SEEDLING BLIGHT)				
Seed Treatment			**per 100 kg seed**	
Infected seed is lightweight and shriveled. Fungicide seed treatment is very effective against this disease. Other options include using tolerant varieties and disease-free seed. Plant into a well-prepared seed bed under good growing conditions. Use wheat in at least a 3-yr rotation since the disease can survive in wheat residue. Avoid planting wheat after corn.	tebuconazole	Raxil FL	180–240 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL	For both commercial seed treatment plants and on-farm treatment using standard gravity flow- or mist-type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within **35** days of planting.
	triticonazole + thiram	**Gemini**	**360 mL**	**For both commercial seed treatment plants and on-farm treatment using standard gravity flow or mist type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not use seed for food, feed or oil processing.**
PYTHIUM DAMPING-OFF				
Seed Treatment			**per 100 kg seed**	
Can occur on all soil types but losses are greatest in cold, wet, clay soils. Minimize soil compaction and remove excess moisture through increased drainage. Seed treatments containing metalaxyl or metalaxyl-M can reduce infection. Delay planting until conditions will result in a rapid and uniform emergence.	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL	For both commercial seed treatment plants and on-farm treatment using standard gravity flow- or mist-type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within **35** days of planting.
	metalaxyl-M	Apron XL LS	20–40 mL	Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze or feed livestock on seeded area for 4 weeks after planting. Read label for information regarding resistant strains of fungus.
	triticonazole + thiram	**Gemini**	**360 mL**	**For both commercial seed treatment plants and on-farm treatment using standard gravity flow or mist type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not use seed for food, feed or oil processing.**

TABLE 5–3. Chemical Control Options for Diseases in Wheat

WHEAT DISEASES				
Integrated Pest Management Options	**Active Ingredient**	**Trade Name**	**Rate**	**Comments (Days to harvest, label precautions, etc.)**
LOOSE SMUT				
Seed Treatment			**per 100 kg seed**	
This fungus infects the embryo at flowering, thus is seed-borne. Light rains or heavy dew and moderate temperature, 15°C–16°C (58°F–60°F) during flowering favour infection. Sow pedigree seed. This disease was quite important in Ontario wheat production but the incidence and hence its impact has been reduced substantially due to the effectiveness of fungicide seed treatments. Continuing with seed treatment and good seed coverage with fungicide seed treatment is important.	carbathiin + thiram	Vitaflo 280	330 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole	Raxil FL	180–240 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL	For both commercial seed treatment plants and on-farm treatment using standard gravity flow- or mist-type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within **35** days of planting.
	triadimenol	Baytan 30	50 mL	Must be diluted with water prior to treatment of seed to ensure uniform coverage. Treated seed will sometimes emerge slower than untreated. Avoid late seeding of winter cereals. Do not graze or feed livestock on treated areas for 40 days after planting.
	triticonazole + thiram	**Gemini**	**360 mL**	**For both commercial seed treatment plants and on-farm treatment using standard gravity flow or mist type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not use seed for food, feed or oil processing.**
COMMON BUNT				
Seed Treatment			**per 100 kg seed**	
Cool soil temperatures after seeding favours this disease. This disease was quite important in Ontario wheat production, but the incidence and hence its impact has been reduced substantially due to the effectiveness of fungicide seed treatments. Use seed that is free of bunt spores (black). Infected seed produces a "fishy" smell.	carbathiin + thiram	Vitaflo 280	230–330 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL	Controls both seed- and soil-borne common bunt. For both commercial seed treatment plants and on-farm treatment using standard gravity flow- or mist-type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within **35** days of planting.
	tebuconazole	Raxil FL	180–240 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.

TABLE 5–3. Chemical Control Options for Diseases in Wheat

WHEAT DISEASES				
Integrated Pest Management Options	**Active Ingredient**	**Trade Name**	**Rate**	**Comments (Days to harvest, label precautions, etc.)**
COMMON BUNT (CONT'D)				
Seed Treatment			**per 100 kg seed**	
	triadimenol	Baytan 30	50 mL	Must be diluted with water prior to treatment of seed to ensure uniform coverage. Treated seed will sometimes emerge more slowly than untreated seed. Avoid late seeding of winter cereals. Do not graze or feed livestock on treated areas for 40 days after planting.
	triticonazole + thiram	**Gemini**	**360 mL**	**For both commercial seed treatment plants and on-farm treatment using standard gravity flow or mist type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not use seed for food, feed or oil processing.**
FOLIAR, STEM AND HEAD DISEASES (See OMAFRA Publication 811, *Agronomy Guide for Field Crops* for Zadok's cereal growth stages)				
FUSARIUM HEAD BLIGHT				
Foliar Treatment			**per ha (per ac)**	
Warm and prolonged wet conditions during flowering are necessary for infection to occur. Avoid planting into corn stubble since the fungus also causes Gibberella stalk rot in corn. Wheat should follow soybeans in the rotation. See Fusarium forecasting Web page at www.ownweb.ca to determine the Fusarium head blight risk for your area and for current recommendations. Consult your local crop advisor for forecast information.	**tebuconazole**	**Folicur 432F**	**292 mL (118 mL)**	***Suppression only.* Ground and aerial application. Timing of application is critical. The optimum window for application is 1 to 4 days after 75% of the heads have emerged or cleared the head (Day 0). Ensure thorough coverage of all wheat heads. Other diseases controlled include rusts (leaf, stem and stripe), Septoria, tan spot and powdery mildew. Ensure thorough coverage of all wheat heads. Avoid excessive water volume (maximum 200 L) at flowering time of wheat as this can increase the risk of infection. Recommended to be used with the registered non-ionic surfactant, Agral 90 or AgSurf at 0.125% vol/vol. Maximum of one application per season. Do not allow livestock to graze or feed green forage to livestock prior to 6 days after treatment. Do not enter treated fields for 12 hours after application. 36 days to harvest.**

TABLE 5–3. Chemical Control Options for Diseases in Wheat

WHEAT DISEASES Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
LATE SEASON SEPTORIA SPP. (GLUME BLOTCH AND LEAF SPOT)				
Wet, windy weather and moderate temperatures favours disease development. Destroying volunteer wheat, reducing crop residue and crop rotation also helps reduce risk. Use less susceptible varieties. See OMAFRA Publication 811, *Agronomy Guide for Field Crops*, for Zadok's cereal growth stages.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground and aerial. Apply at early signs of disease from tillering (Zadok's 21 growth stage) to head half emerged (Zadok's 55 growth stage). Can be tank mixed with certain cereal herbicides. 45 days to harvest.
		Bumper 418 EC	**300 mL (121 mL)**	**Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok's 29-37). If conditions favourable to disease continue, another application will be necessary. A second spray may be applied before head is half emerged (Zadok's 49-55). Can be tank mixed with several cereal herbicides. 45 days to harvest**
	mancozeb	Dithane DG Rainshield NT	1.1 kg — early (440 g) 2.25 kg — late (900 g)	Use lower rate for applications at Zadok's 12–21 growth stage, when crop is in 3rd leaf to tillering. Higher rate for applications at Zadok's 59 growth stage when head is fully emerged but prior to flowering. No more than 2 application/yr. 40 days to harvest. Do not graze crop or cut for hay.
	pyraclostrobin	Headline EC	400 mL (160 mL)	Ground or aerial. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply after the boot stage (Zadok's 47) and beyond. Maximum two applications per season. 48 hr re-entry period.
POWDERY MILDEW			**per ha (per ac)**	
The fungus is very susceptible to weather conditions that promote drying of the crop environment such as hot, dry sunny weather. Management includes the use of tolerant varieties, crop rotation, tillage and fungicides. See OMAFRA Publication 811, *Agronomy Guide for Field Crops* for thresholds and more information.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground and aerial application. Apply at early signs of disease from tillering to head half emerged. Can be tank mixed with several cereal herbicides. 45 days to harvest.
		Bumper 418 EC	**300 mL (121 mL)**	**Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok's 29-37). If conditions favourable to disease continue, another application will be necessary. A second spray may be applied before head is half emerged (Zadok's 49-55). Can be tank mixed with several cereal herbicides. 45 days to harvest**

TABLE 5–3. Chemical Control Options for Diseases in Wheat

WHEAT DISEASES

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate per ha (per ac)	Comments (Days to harvest, label precautions, etc.)
POWDERY MILDEW (cont'd)				
	pyraclostrobin	Headline EC	400 mL (160 mL)	Ground or aerial. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply after the boot stage (Zadok's 47) and beyond. Maximum two applications per season. 48 hr re-entry period.
RUST (LEAF AND STEM)				
Leaf rust blows in from the southern United States late in the season. Stem rust has common barberry as an alternate host therefore removing this alternate host will help minimize stem rust. Use tolerant varieties. Use foliar treatments when flag leaf has 5–10 pustules (1% leaf area). See OMAFRA Publication 811, *Agronomy Guide for Field Crops*, for Zadok's cereal growth stages.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground and aerial application. Apply at early signs of disease from tillering to head half emerged. Can be tank mixed with several cereal herbicides. 45 days to harvest.
		Bumper 418 EC	**300 mL (121 mL)**	**Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok's 29-37). If conditions favourable to disease continue, another application will be necessary. A second spray may be applied before head is half emerged (Zadok's 49-55). Can be tank mixed with several cereal herbicides. 45 days to harvest**
	mancozeb	Dithane DG Rainshield NT	1.1 kg — early (440 g) 2.25 kg — late (900 g)	Leaf rust only. Use lower rate for applications at Zadok's 12–21 growth stage, when crop is in 3rd leaf to tillering. Higher rate for applications at Zadok's 59 growth stage when head is fully emerged but prior to flowering. No more than 2 applications/yr. 40 days to harvest. Do not graze crop or cut for hay.
	pyraclostrobin	Headline EC	400 mL (160 mL)	Ground or aerial. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply after the boot stage (Zadok's 47) and beyond. Maximum two applications per season. 48 hr re-entry period.

TABLE 5–3. Chemical Control Options for Diseases in Wheat

WHEAT DISEASES

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate per ha (per ac)	Comments (Days to harvest, label precautions, etc.)
TAN SPOT				
Reduced tillage and cool, cloudy humid weather promotes this disease. This disease survives in crop residues. Avoid planting wheat in conservation tillage fields in which wheat was grown during the preceding 2 years. See OMAFRA Publication 811, *Agronomy Guide for Field Crops*, for Zadok's cereal growth stages.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground and aerial application. Apply at early signs of disease from tillering to head half emerged. Can be tank mixed with several cereal herbicides. 45 days to harvest.
		Bumper 418 EC	**300 mL (121 mL)**	**Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok's 29-37). If conditions favourable to disease continue, another application will be necessary. A second spray may be applied before head is half emerged (Zadok's 49-55). Can be tank mixed with several cereal herbicides. 45 days to harvest**
	mancozeb	Dithane DG Rainshield NT	1.1 kg — early (440 g) 2.25 kg — late (900 g)	Use lower rate for applications at Zadok's 12–21 growth stage, when crop is in 3rd leaf to tillering. Higher rate for applications at Zadok's 59 growth stage when head is fully emerged but prior to flowering. No more than 2 applications/yr. 40 days to harvest. Do not graze crop or cut for hay.
	pyraclostrobin	Headline EC	400 mL (160 mL)	Ground or aerial. Apply only up to flag leaf fully emerged stage (Zadok's 39 Do not apply after the boot stage (Zadok's 47) and beyond. Maximum two applications per season. 48 hr re-entry period.

TABLE 5–5. Chemical Control Options for Diseases in Barley, Oats and Rye

BARLEY, OATS AND RYE DISEASES				
Integrated Pest Management Options	**Active Ingredient**	**Trade Name**	**Rate**	**Comments (Days to harvest, label precautions, etc.)**
BARLEY				
SEED ROT AND SEEDLING DISEASES				
SEED ROT AND SEEDLING BLIGHT				
Seed Treatment			**per 100 kg seed**	
Ensure good coverage of seed treatment on seeds. Rotation with non-host crops for at least 2 yr will reduce risk. Use disease-free seed and avoid deep seeding.	tebuconazole	Raxil FL	180–240 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	carbathiin + thiram	Vitaflo 280	230–330 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	triticonazole + thiram	**Gemini**	**360 mL**	**For both commercial seed treatment plants and on-farm treatment using standard gravity flow or mist type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not use seed for food, feed or oil processing.**
COVERED SMUT (COMMON BUNT)				
Seed Treatment			**per 100 kg seed**	
Infection can occur at temperatures of 14°C–25°C (57°F–68°F), especially when the soil moisture levels are high. Seed treatment is the primarily method of control.	tebuconazole	Raxil FL	180–240 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	triadimenol	Baytan 30	50 mL	Spring Barley. Must be diluted with water prior to treatment of seed to ensure uniform coverage. Treated seed will sometimes emerge more slowly than untreated seed. Avoid late seeding of winter cereals. Do not graze or feed livestock on treated areas for 40 days after planting.
	carbathiin + thiram	Vitaflo 280	230–330 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	triticonazole + thiram	**Gemini**	**360 mL**	**For both commercial seed treatment plants and on-farm treatment using standard gravity flow or mist type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not use seed for food, feed or oil processing.**

TABLE 5–5. Chemical Control Options for Diseases in Barley, Oats and Rye

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
BARLEY, OATS AND RYE DISEASES				
LOOSE SMUT				
Seed Treatment			**per 100 kg seed**	
Infection occurs during flowering. Conditions that promote the disease are wet, cloudy weather and moderate temperatures 16°C–22°C (60°F–72°F). Sow pedigree seed. Moist weather at flowering promotes this disease. Use seed treatment on seed known to have high levels of infection.	tebuconazole	Raxil FL	180–240 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	triadimenol	Baytan 30	50 mL	Must be diluted with water prior to treatment of seed to ensure uniform coverage. Treated seed will sometimes emerge more slowly than untreated seed. Avoid late seeding of winter cereals. Do not graze or feed livestock on treated areas for 40 days after planting.
	carbathiin + thiram	Vitaflo 280	330 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	triticonazole + thiram	**Gemini**	**360 mL**	**For both commercial seed treatment plants and on-farm treatment using standard gravity flow or mist type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not use seed for food, feed or oil processing.**
LEAF, STEM AND HEAD DISEASES				
NET BLOTCH, SPOT BLOTCH, SCALD, SEPTORIA LEAF SPOT			**per ha (per ac)**	
Avoid growing barley after barley, wheat or grasses. Plow down stubble and straw and plant early to avoid serious disease in July.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground and aerial application. Apply at early signs of disease from tillering to head half emerged. Can be tank mixed with several cereal herbicides. 45 days to harvest.
		Bumper 418 EC	**300 mL (121 mL)**	**Ground and aerial application. Apply at early signs of disease from tillering to head half emerged. Can be tank mixed with several cereal herbicides. 45 days to harvest.**
	pyraclostrobin	Headline EC	400 mL (160 mL)	Ground or aerial. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply at boot stage (Zadok's 47) and beyond. Maximum two applications per season. 48 hr re-entry period.

TABLE 5–5. Chemical Control Options for Diseases in Barley, Oats and Rye

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
BARLEY, OATS AND RYE DISEASES				
RUST (LEAF AND STEM)			per ha (per ac)	
Leaf rust spores are blown in from the United States and in most years late planted fields are most likely to show the disease. Alternate host is barberry. Remove or destroy alternate host from fence rows, etc. Plant early.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground and aerial application. Apply at early signs of disease from tillering to head half emerged. Can be tank mixed with several cereal herbicides. 45 days to harvest.
		Bumper 418 EC	**300 mL (121 mL)**	**Ground and aerial application. Apply at early signs of disease from tillering to head half emerged. Can be tank mixed with several cereal herbicides. 45 days to harvest.**
	pyraclostrobin	Headline EC	400 mL (160 mL)	Ground or aerial. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply at boot stage (Zadok's 47) and beyond. Maximum two applications per season. 48 hr re-entry period.
OATS				
SEED ROT AND SEEDLING DISEASES				
SEED ROT AND SEEDLING BLIGHT				
Seed Treatment			**per 100 kg seed**	
Ensure good coverage of seed treatment on seeds. Rotation with non-host crops for at least 2 yr will reduce risk. Use disease-free seed and avoid deep seeding.	**carbathiin + thiram**	**Vitaflo 280**	**330 mL**	**Do not graze or feed livestock on treated areas for 6 weeks after planting.**
	difenoconazole + metalaxyl-M	**Dividend XL RTA**	**325–650 mL**	**For both commercial seed treatment plants and on-farm treatment using standard gravity flow- or mist-type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.**

TABLE 5–5. Chemical Control Options for Diseases in Barley, Oats and Rye

BARLEY, OATS AND RYE DISEASES				
Integrated Pest Management Options	**Active Ingredient**	**Trade Name**	**Rate**	**Comments (Days to harvest, label precautions, etc.)**
COVERED SMUT (COMMON BUNT), LOOSE SMUT				
Seed Treatment			**per 100 kg seed**	
Spread from year to year primarily through infected seed. Wind-blown spores will infect florets within season. Use a fungicide seed treatment on infected seed.	**carbathiin + thiram**	**Vitaflo 280**	**330 mL**	**Do not graze or feed livestock on treated areas for 6 weeks after planting.**
	difenoconazole + metalaxyl-M	**Dividend XL RTA**	**325–650 mL**	**For both commercial seed treatment plants and on-farm treatment using standard gravity flow- or mist-type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.**
	triticonazole + thiram	**Gemini**	**360 mL**	**For both commercial seed treatment plants and on-farm treatment using standard gravity flow or mist type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not use seed for food, feed or oil processing.**
	tebuconazole	Raxil 250 FL	240–360 mL	**For Loose Smut control only.** Do not graze or feed livestock on treated areas for 4 weeks after planting.
PYTHIUM DAMPING-OFF				
Seed Treatment			**per 100 kg seed**	
Can occur on all soil types but losses are greatest in cold, wet, clay soils. Minimize soil compaction and remove excess moisture through increased drainage. Seed treatments containing metalaxyl or metalaxyl-M can reduce infection. Delay planting until conditions will result in a rapid and uniform emergence.	**carbathiin + thiram**	**Vitaflo 280**	**330 mL**	**Do not graze or feed livestock on treated areas for 6 weeks after planting.**
	difenoconazole + metalaxyl-M	**Dividend XL RTA**	**325–650 mL**	**For both commercial seed treatment plants and on-farm treatment using standard gravity flow- or mist-type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.**

TABLE 5–5. Chemical Control Options for Diseases in Barley, Oats and Rye

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
BARLEY, OATS AND RYE DISEASES				
LEAF, STEM AND HEAD DISEASES				
SEPTORIA LEAF SPOT			**per ha (per ac)**	
Avoid planting oats after oats or mixed grain. Humid, wet, windy weather promotes disease.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground and aerial application. Apply at early signs of disease from tillering to head half emerged. 45 days to harvest.
		Bumper 418 EC	**300 mL (121 mL)**	**Ground and aerial application. Apply at early signs of disease from tillering to head half emerged. Can be tank mixed with several cereal herbicides. 45 days to harvest.**
CROWN (LEAF) RUST			**per ha (per ac)**	
European buckthorn is the alternate host. Can be a problem in central and Eastern Ontario. Use resistant varieties. Plant early to allow plants to mature before inoculum levels become heavy. Remove or destroy buckthorn.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground and aerial application. Apply at early signs of disease from tillering to head half emerged. 45 days to harvest.
		Bumper 418 EC	**300 mL (121 mL)**	**Ground and aerial application. Apply at early signs of disease from tillering to head half emerged. Can be tank mixed with several cereal herbicides. 45 days to harvest.**
RYE				
SEED ROT AND SEEDLING DISEASES				
SEEDLING BLIGHT			**per 100 kg seed**	
Sow into well-prepared seed bed under good growing conditions. Avoid cool, wet conditions that will reduce emergence and increase seed rots and blights. Treat seed with a fungicide seed treatment.	carbathiin + thiram	Vitaflo 280	230–330 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL	For both commercial seed treatment plants and on-farm treatment using standard gravity flow- or mist-type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.

TABLE 5–5. Chemical Control Options for Diseases in Barley, Oats and Rye

BARLEY, OATS AND RYE DISEASES				
Integrated Pest Management Options	**Active Ingredient**	**Trade Name**	**Rate**	**Comments (Days to harvest, label precautions, etc.)**
PYTHIUM DAMPING-OFF				
Seed Treatment			**per 100 kg seed**	
Can occur on all soil types but losses are greatest in cold, wet, clay soils. Minimize soil compaction and remove excess moisture through increased drainage. Seed treatments containing metalaxyl or metalaxyl-M can reduce infection. Delay planting until conditions will result in a rapid and uniform emergence.	carbathiin + thiram	Vitaflo 280	230–330 mL	Do not graze or feed livestock on treated areas for 4 weeks after planting.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL	For both commercial seed treatment plants and on-farm treatment using standard gravity flow- or mist-type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
SEED-BORNE SEPTORIA				
Seed Treatment			**per 100 kg seed**	
Use good quality seed that has been treated with a fungicide seed treatment to prevent seed-borne infection. Current varieties have limited tolerance. Foliar fungicides provide effective control of *Septoria* leaf spot and *Stagonospora* glume blotch. Application thresholds range depending on wheat growth stage.	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL	For both commercial seed treatment plants and on-farm treatment using standard gravity flow- or mist-type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
COMMON BUNT, DWARF BUNT				
Seed Treatment			**per 100 kg seed**	
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL	For both commercial seed treatment plants and on-farm treatment using standard gravity flow- or mist-type seed treatment equipment. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.

6. Dry Edible Beans

TABLE 6–1. Chemical Control Options for Insects in Dry Edible Beans

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
INSECTS				
SEEDCORN MAGGOT				
Seed Treatment			**per ha (per ac)**	
Risk factors include cool, wet springs when germination is delayed. Expect only 60%–70% control when using seed treatments.	diazinon + captan + thiophanate-methyl	DCT	1 L of slurry	Available as 400-g container and will treat 77 kg of dry bean seed. Use full rate and ensure good coverage by applying as a slurry. To make slurry, use 520 g seed treatment/L of water.
			per 100 kg seed	
	thiamethoxam	**Cruiser 350FS**	**86–143 mL**	**For use in commercial seed treaters only. Use higher rate when insect populations are expected to be high. Do not graze or feed livestock on treated areas for 45 days after planting.**
POTATO LEAFHOPPER				
Seed Treatment			**per 100 kg seed**	
	thiamethoxam	**Cruiser 350FS**	**86–143 mL**	**For use in commercial seed treaters only. Use higher rate to replace one application of a foliar treatment spray. Do not graze or feed livestock on treated areas for 45 days after planting.**

TABLE 6–3. Chemical Control Options for Diseases in Dry Edible Beans

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
DISEASES				
BEAN RUST			**per ha (per ac)**	
This disease is extremely rare in Ontario arriving late in the season. Some dry bean market classes (eg. pinto beans) can be very susceptible to rust. If rust arrives during flowering and early pod set a treatment may be necessary.	propiconazole	Tilt 250 E	500 mL (200 mL)	Ground or aerial application. Apply when disease is first detected. Maximum of 2 applications per season. 28 days to harvest.
		Bumper 418 EC	**300 mL (121 mL)**	**Ground or aerial application. Apply when disease is first detected. Maximum of 2 applications per season. 28 days to harvest.**
	pyraclostrobin	Headline EC	400 mL (160 mL)	Ground or aerial application. Apply when disease first appears. If necessary, re-apply 10–14 days later if disease persists. Maximum of 2 applications per season. 30 days to harvest. 48 hr re-entry period.

7. Canola and Mustard

TABLE 7–1. Chemical Control Options for Insects in Canola and Mustard

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (Days to harvest, label precautions, etc.)
INSECTS				
CABBAGE SEEDPOD WEEVIL			**per ha (per ac)**	
Foliar insecticide will not control larvae within the canola pod, therefore insecticide must be applied to adults prior to egg-laying. Refer to the OMAFRA website for more information on scouting techniques and thresholds. Canola is a valuable honey source and is utilized by honeybees. Bees also pollinate the crop. If spraying an insecticide, ensure there are no honey producing hives in your area.	cyhalothrin-lambda	Matador 120	83 mL (34 mL)	**For adult control only.** Ground and aerial application. Maximum 1 applications/yr, Tank-mixing with clay-based fungicides is not recommended as these fungicides may affect insecticide efficacy. **7 days to harvest interval.**
TARNISHED PLANT BUG			**per ha (per ac)**	
Tarnished plant bug sting plant tissue including pods and flowers. This causes scarring, malformation and dimpling or pitting on pods. They can also drill into the seed. If flowers are still present, they can prick the flowers and cause them to abort. Though no thresholds have been validated for Ontario, spraying is recommended when 2 bugs per sweep after petal fall are found.	cyhalothrin-lambda	Matador 120	83 mL (34 mL)	Ground and aerial application. Maximum 3 applications/yr, Tank-mixing with clay-based fungicides is not recommended as these fungicides may affect insecticide efficacy. 7 days to harvest interval.
	trichlorfon	**Dylox 420**	**1.37 L (55 mL)**	**Do not apply within 21 days to harvest.**

TABLE 7–2. Chemical Control Options for Diseases in Canola and Mustard

DISEASES				
Integrated Pest Management Options	**Active Ingredient**	**Trade Name**	**Rate**	**Comments (Days to harvest, label precautions, etc.)**
BLACKLEG				
Foliar Treatment			**per ha (per ac)**	
	propiconazole	Tilt 250 E	500 mL (200 mL)	Canola only. Ground and aerial application. Apply at rosette stage. Do not feed treated canola refuse to livestock. 60 days to harvest.
		Bumper 418 EC	**300 mL (121 mL)**	**Canola only. Apply during the rosette stage, between 2nd true leaf and bolting. 60 days to harvest.**
	azoxystrobin	Quadris	500 mL (200 mL)	Canola only. Apply at 2–6-leaf stage. See label for information regarding resistant strains of fungus. Plant back interval of 30 days for broadleaf and root crops and 45 days for cereals required. 30 days to harvest.

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